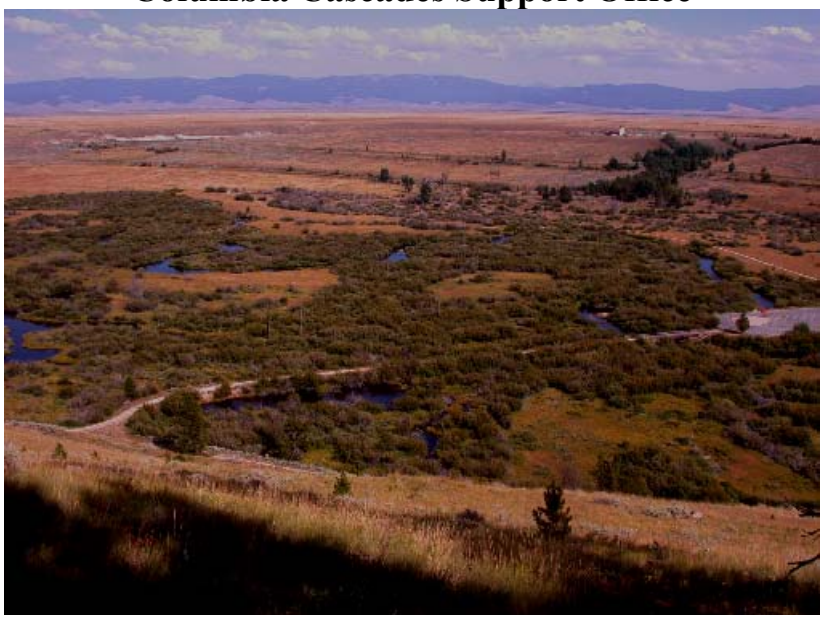
Report for Subagreement No. 20
to
Cooperative Agreement No. CA9000-95-018
Mammal and Herpetological Inventories
Big Hole National Battlefield

University of Idaho
and
National Park Service
Columbia Cascades Support Office



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Crystal Ann Strobl
Lisa Garrett
Tom Rodhouse

Department of Fish and Wildlife Resources
University of Idaho
PO Box 441136
Moscow, Idaho 83844-1136

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Executive Summary

This primary objective of the 2002 mammal and herpetological inventory was to document 90% of all mammals (excluding bats), amphibians, and reptiles that potentially occur within Big Hole National Battlefield. The University of Idaho Department of Fish and Wildlife Resources conducted the 2002 inventory under a cooperative agreement with the National Park Service Northern Semi-Arid Network. Additional goals of the inventory included development of baseline data for use in future monitoring, and the collection and dissemination of new information on the distribution, habitat association, and population status of the region's biological resources.

Expected species lists were developed by reviewing range maps and interviewing park staff. This effort resulted in a list of 35 species of mammals and 4 species of herpetofauna expected to occur within the Big Hole National Battlefield. A total of 31 mammals, representing 88% of the expected list, were confirmed in the battlefield in 2002. A total of 4 herpetofauna, representing 100% of the expected list, were confirmed in 2002. Two confirmed species, the western toad (*Bufo boreas*) and the gray wolf (*Canis lupus*), are listed by the Montana Natural Heritage Program as "species of special concern".

Big Hole National Battlefield was surveyed over 8 days on 2 separate periods during July and August, 2002. Sampling techniques used in the inventory included visual encounter surveys, dipnetting, cover turning, road surveys, and trapping. Although bats were not included in the 2002 inventory due to logistical constraints, an effort was made to determine bat activity in the battlefield for future inventory work. No bats were observed during the sampling period in 2002.

The Columbia spotted frog (*Rana luteiventris*) was the most widely distributed and most abundant amphibian in the battlefield. The common garter snake (*Thamnophis elegans*) was the most widely distributed and most abundant reptile detected during these surveys. The mammals with the highest abundance at the battlefield were the Columbian ground squirrel (*Spermophilus columbianus*), the deer mouse (*Peromyscus maniculatus*), the meadow vole (*Microtus pennsylvanicus*), the red squirrel (*Tamiasciurus hudsonicus*), and the western jumping mouse (*Zapus princeps*).

I. Introduction

This report summarizes the results of the 2002 mammal (excluding bats) and herpetological inventory for the Big Hole National Battlefield. The mammal inventory did not include bats within its scope due to logistical constraints. The University of Idaho Department of Fish and Wildlife Resources conducted the inventory under a cooperative agreement with the National Park Service Northern Semi-Arid Network. The inventory is part of a nationwide inventory and monitoring (I & M) program initiated by the National Park Service Natural Resource Challenge. This program seeks to increase the National Park Service's (NPS) capacity to assess the current state of natural resources within the NPS system and to enhance its ability to take a leading role in preserving the nation's biological diversity of plants and animals. Completing basic biological inventories is a crucial first step in achieving that goal.

In 2000, the Northern Semi-Arid Network parks began implementing the inventory phase of the I & M program in several network parks. Historic information available on the plant and animal populations within the network were assembled and an estimate was made of the percent of species expected to occur in each park. Significant vertebrate inventory work had been previously conducted in the battlefield by Van Sickle (1987) and Monello and Wright (1998). This work and information provided by NPS indicated that 54% of the expected mammals and over 90% of the expected herpetofauna were present and documented (Wright et. al. unpublished). The mammal portion of the inventory was given the highest priority and the herpetological portion, with no anticipated documentation gaps, was conducted incidental to mammal work in 2002. Concern over the status of the western toad in the region was an important impetus in driving additional herpetological work in Big Hole NB. Fieldwork was conducted for the inventory during July 8-12 and August 22-24, 2002.

The objectives of the 2002 mammal and herpetological inventory at the Big Hole National Battlefield were to: (1) Document at least 90% of the mammal species and reconfirm the presence of amphibian and reptile species expected to occur in the battlefield; (2) Gather baseline data for use in future monitoring; and (3) Collect and disseminate new information on the distribution, habitat association, and population status of the mammal and herpetological species of the region.

II. Study Area

Big Hole National Battlefield is located in western Montana 10 miles west of Wisdom, along Highway 43 (Figure 1). The battlefield was originally established as a national monument in 1910 and has grown from 5 acres to its current size of 655 acres. Elevations in the battlefield range from 1913 m to 2134 m (6276 ft - 7000 ft). 30-year (1971-2000) climate data collected in Wisdom show that the site is quite dry, with mean annual precipitation only totaling 30 cm (12 in) (Western Regional Climate Center 2003). January and July 30-year mean maximum and minimum temperatures are 27 and 1.5 degrees F^o and 77 and 37 degrees F^o, respectively (Western Regional Climate Center 2003). The battlefield is situated within a matrix of US Forest Service land and private ranches. The North Fork of the Big Hole River bisects the site, and it is flanked by Battle Mountain in the northwest and Ruby Bench along the southeast portion of the battlefield. These features create a diverse landscape in the battlefield. Vegetation consists of sagebrush uplands, grass and willow riparian areas, and coniferous forest. The Montana Land Cover Atlas (Fisher et al. 1998) shows five habitat types represented in Big Hole NB; (1) altered herbaceous, (2) low/moderate cover grasslands, (3) sagebrush, (4) Douglas fir/lodgepole pine, and (5) shrub riparian. These habitat types are further subdivided into categories and sub-categories, which are explained in detail in the following section.

The altered herbaceous community is dominated by the following species; cheatgrass (*Bromus tectorum*), spotted knapweed (*Centaurea maculosa*), yellow sweet-clover (*Melilotus officinalis*), common dandelion (*Taraxacum officinale*), smooth brome (*Bromus inermis*), yarrow (*Achillea millefolium*), and yellow star thistle (*Centaurea solstitialis*). The majority of the low/moderate cover grassland community consists of the following species; timothy (*Phleum pratense*), bluebunch wheatgrass (*Agropyron spicatum*), Idaho fescue (*Festuca idahoensis*), slender wheatgrass (*Agropyron caninum*), great basin wildrye (*Elymus cinereus*), crested wheatgrass (*Agropyron cristatum*), and arrowleaf balsamroot (*Balsamorhiza sagittata*). The sagebrush community consists of the following species; mountain big sagebrush (*Artemisia tridentata vaseyana*), common bearberry (*Arctostaphylos uva-ursi*), gray rabbitbrush (*Chrysothamnus nauseosus*), and common snowberry (*Symphoricarpos albus*). The Douglas fir/lodgepole pine community consists of Douglas fir (*Pseudotsuga menziesii*) and lodgepole pine (*Pinus contorta*). The shrub riparian community consists of species such as; willow (*Salix spp.)*, prickly rose (*Rosa acicularis*), cottonwood (*Populus spp.*), currant (*Ribes spp.*), aspen (*Populus tremuloides*), creeping Oregon grape (*Mahonia repens*), and common horsetail (*Equisetum arvense*).

III. Methods

The methods utilized in the 2002 Big Hole National Battlefield mammal and herpetological inventory generally follow those laid out in the Northern Semi-Arid Network Study Plan (Wright et. al. unpublished) and a previous network herpetological inventory (Shive and Peterson 2002). Methods and procedures were adapted somewhat to accommodate logistical constraints.

All locations provided in this report were collected as Universal Transverse Mercator (UTM) coordinates (Zone 11 &12) using a Garmin 12-channel Etrex hand-held GPS unit (Garmin International, Inc. Olathe, KS). The North American Datum of 1927 was used as the horizontal datum for all locations. Elevations were also collected using the GPS unit. UTM locations were collected at all of the survey sites including the starting points of small mammal transects, wire funnel trap deployment locations, wetland survey sites, and at points of incidental observations. All coordinates were collected with navigational accuracy of 18 meters or less. In a few instances locations could not be recorded within the desired accuracy due to topographical disruptions, and accuracy within 30 meters was accepted and recorded.

Scientific and common names used in this report follow the Integrated Taxonomic Information System (ITIS). The ITIS follows closely the USGS Biological Resource Division's unpublished and expanded update of the 1987 Checklist of Vertebrates of the United States, the U.S. Territories, and Canada (ITIS 2003). The NPSpecies database, to which species documentations made during the 2002 inventory will be added, also follows ITIS.

A. Expected Species

Development of expected species lists was accomplished by reviewing historical inventory materials (i.e. Van Sickle 1987), interviewing NPS staff, and reviewing published range maps and distribution information. The following sources were reviewed for mammal and herpetofauna distributions; Montana Gap Analysis (1998), National Audubon Society Field Guide to North American Mammals (1998), A Field Guide to Western Reptiles and Amphibians (1985), Reptiles of the Northwest (2002), and Mammals of the Rocky Mountains (2000). The following four criteria were considered in determining expected species; (1) the species' predicted range overlaps with the study area; (2) suitable elevation exists within the study area; (3) suitable habitat exists within the study area; and (4) the species is likely to be detected through one or more of the inventory techniques. A species was classified as "expected" if at least three of the criteria were supported. A species was classified as "possible" if it only met two of the criteria and if the detectability was "variable". A species was classified as "unlikely" if only one of the criteria was supported and if the detectability was "low". Tables 1 and 2 summarize these criteria for expected species and tables in Appendix A summarize these criteria for species considered unlikely for the 2002 inventory. Appendix C contains a key to the NPSpecies codes used in these tables.

B. Sampling Site Selection

Sampling sites were non-randomly located in areas with suitable habitat for target species (i.e., lakes, ponds, riparian areas, forested areas, south-facing aspects), areas where animal activity was obvious, and areas where historic observations were made. Photo documentation of the various habitat types where sampling sites were located was taken with a Nikon Coolpix E995 digital camera. These photographs provide NPS staff with a visual description of the area and may also be used as photopoints to monitor future habitat changes. These photos are included in Appendix D.

Olson et al. (1997) recommended a minimum of two site visits for inventory objectives and a minimum of two site visits annually for monitoring to account for seasonal, weather, and life-stage influences on species detectability. Following this approach, field sampling was conducted during two separate occasions in 2002. Sampling session occurred over 8 days during July 8-12 and August 22-24.

C. Sampling Techniques

A wide variety of sampling techniques were used in the 2002 inventory and included visual encounter surveys, dip netting, cover turning, road surveys, trapping, and incidental observations. The combination of methods was used to complement the overall objective of detecting as many species as possible and to increase the likelihood of detecting cryptic species. An array of environmental characteristics was collected at each sampling site as well. Each individual technique is described in further detail below.

1. Site Characteristics and Environmental Measurements

Each aquatic sampling site was classified according to the National Wetlands Inventory (NWI) classification criteria of wetland and deepwater habitats (Cowardin et al. 1979). The physical and biological characteristics of each oxbow or river site were described using a standard form (Peterson 1997; Appendix D). Environmental measurements collected included radiation, wind speed, cloud cover, precipitation, air, and water temperature. An Oakton TDSTestr High+ was used to measure conductivity and an Oakton pH Testr 2 with ATC (Forestry Supply, Jackson, MS) was used to measure pH.

Additional site characteristics were collected for aquatic sites, including origin, drainage, site type, length, width, maximum depth, color, and turbidity. Site width and length were visually estimated and the depth was ranked into one of three categories (<1 m, 1-2 m, >2 m). Water temperature was taken within the shade at a depth of 1 cm using a mercury thermometer. Air temperature was also taken in the shad at a height of 1 m on the edge of the watershed. Wetland habitat characteristics such as primary substrate, percent emergent vegetation, emergent vegetation species, north shore characteristics, distance to forest edge, and forest tree species were all recorded on the data sheets.

The calibration of pH and conductivity meters was done prior to each survey session using buffer solutions. Waders and dip nets were sterilized with a bleach solution (10-20%) after each site

was surveyed. The cleaning of sampling gear was implemented to decrease the chances of spreading bacteria, pollutants, or disease throughout the study area.

The following site characteristics for terrestrial site where mammal and wire funnel traps were located included UTM, transect bearing, topographic position, location description, general habitat description, and weather during the trap period. Slope and aspect of each site were recorded where applicable. The moon phase was noted for mammal trapping. Sample data sheets are included in Appendix B. All traps were sterilized with a bleach solution (10-20%) after each trapping session.

2. Visual Encounter Surveys

This method was used frequently with a great deal of success. Visual encounter surveys were conducted by walking and searching for signs of amphibians, reptiles and mammals. Areas of suitable habitat for target species were surveyed extensively. Some of the indicators of species presence were tracks, scat, shed antlers, calls, and evidence of den sites. Both diurnal and nocturnal surveys were conducted, since many of the target species are nocturnal.

3. Dip netting

Dip-nets were an effective tool for catching and observing all life stages of amphibians and some reptiles. Dip netting was particularly effective in areas with dense emergent vegetation. Palustrine (e.g. pools, marsh) areas were slowly searched by sweeping nets in front and alongside the path of travel every 2 meters.

4. Cover Turning

This method was helpful in detecting reptile and amphibian species. Large boulders, logs, and human-made structures are examples of objects that are often used by these animals as cover. Care was taken to replace cover objects in order to minimize disturbance. Likewise, the same cover objects were never flipped repeatedly (e.g. every day) in order to reduce disturbance.

5. Road Surveys

Road surveys were effective for both reptiles and mammals, although the park has a limited number of roads. These surveys were conducted during both day and twilight hours by slowly driving along roads within and adjacent to the study area. Both road kills and live animals moving across the road were detected using this technique.

6. Trapping

Several different types of trapping methods were used in the 2002 inventory that targeted both herpetofauna and mammals. Wire funnel traps were used to capture amphibian and reptile species and some mammals were captured in these traps as well. Sherman live traps (LFATDG, H.B. Sherman Traps Inc.), museum special snap traps, and 1 wire cage mammal live trap (7 x 7 x 24) were used to capture mammals. Wire funnel traps were placed along objects present at the

battlefield (e.g. downed trees, boulders) that had the potential of directing animals into traps. These traps were placed in all habitat types in the battlefield. Small mammals were frequently captured in these traps when placed near water. Sherman live traps were deployed in combination with Museum Special snap traps along transects in order to capture small mammals. Transects consisted of 5-10 trap stations spaced every 10 meters. Each station had one live trap and one snap trap. All traps were baited with rolled oats, black-oil sunflower seeds, and peanut butter. Transects were pre-baited for 1-2 nights prior to opening of the trap line to increase trapping success. Traps were checked, closed, and reopened daily. The trapping period consisted of two consecutive trap nights. The wire cage small mammal live trap was baited with tuna and placed at tree line at the end of the Howitzer Trail. This trap was deployed for two nights, and checked and re-baited daily.

7. Incidental Observations

Incidental observations of animals were frequently made during the 2002 inventory. Incidental sightings of amphibian and reptile species were documented using a standard form for detection (Appendix B). Mammal sightings were recorded in a field notebook. A detailed description of the animal's location, topographic position, habitat type, and weather were all recorded when an animal was discovered. Air temperature and ground temperatures were collected for reptiles. Photographic documentation was also taken for representative species residing at the site.

D. Data Management

All necessary information was entered into Microsoft Excel for storage and analysis. Geographic locations were stored and displayed using ArcMap and ArcView 3.2. All species data will be archived in the NPSpecies database, which houses information on species status, abundance, residency, nativity, management priority, and exploitation concern information for all plant and animal species documented on NPS lands.

IV. Results

A. Confirmed Species

A total of 4 species of herpetofauna (2 amphibians and 2 reptiles) were expected to occur in the Big Hole National Battlefield and all 4 were confirmed in 2002. All 4 of these species were confirmed during a previous vertebrate inventory conducted by Van Sickle in 1987. Table 1 shows the list of herpetofauna present in the battlefield and their status. A total of 35 species of non-volant mammals were expected to occur in the battlefield and 31 species, representing 88% of the expected species, were confirmed during the 2002 inventory. Table 2 shows the list of expected mammals and their status in the battlefield.

There were 9 small mammal transects, 10 wire funnel traps, and 1 wire cage mammal live trap used during the 8 days of the 2002 inventory. In addition to the vertebrates captured in the trapping effort, 11 incidental observations of vertebrates were also made. Both species with status as federal or state species of concern, the western toad and the gray wolf, were documented with incidental observations. One individual western toad was found in tall sedges near an oxbow of the Big Hole River. This species was observed twice during the 1987 inventory conducted by Van Sickle. This species appears to be rare in the battlefield. The gray wolf was detected in the battlefield through scat found in the conifer forest on the flank of Battle Mountain. Figure 3 shows the location of trapping locations and species observations. Tables 3 and 4 show the total number of vertebrates detected through sign (tracks, den sites, scat, calls, etc.), trapping, and direct observation.

B. Abundance

The species with the highest abundance during the survey were the Columbia spotted frog (*Rana luteiventris*), the common garter snake (*Thamnophis elegans*), the Columbian ground squirrel (*Spermophilus columbianus*), the deer mouse (*Peromyscus maniculatus*), the meadow vole (*Microtus pennsylvanicus*), the red squirrel (*Tamiasciurus hudsonicus*), and the western jumping mouse (*Zapus princes*). Figure 2 shows the estimated number of herpetofauna in the battlefield during the 2002 inventory. The number of spotted frogs was estimated at over 2000 individuals, based on the presence of tadpoles and other life stages in wetlands adjacent to the Big Hole River. There were over thirty common garter snakes found on several occasions in the shrub riparian habitat type. Over 15 individuals, including both juveniles and adults, were present at one of these encounters, and this may have been a den site. The abundance of some mammals, such as the red squirrel, was difficult to estimate because they were observed rather than captured. Based on trapping results, deer mice were the most abundant small mammals, with 28 individuals captured. Meadow voles and western jumping mice were also quite abundant, with 10 and 8 individuals captured, respectively. Table 4 shows the estimated numbers of individuals observed in the battlefield during the 8 days of the 2002 inventory.

C. Bats

Although bats were not formally included in the 2002 inventory, several brief evening searches were made for bats in the battlefield in order to provide information for future bat surveys. Over the eight days spent at the battlefield in 2002, no bats were observed. However, suitable riparian habitat and an abundance of potential roost sites exist in and near the battlefield. Future bat surveys are recommended.

Acknowledgements

The 2002 Big Hole National Battlefield mammal and herpetological inventory was made possible through a cooperative agreement between the National Park Service Northern Semi-Arid Network and University of Idaho Department of Fish and Wildlife Resources. We would like to thank Gerry Wright of USGS Idaho Cooperative Wildlife Research Unit and the Big Hole National Battlefield for providing leadership, direction, and enthusiasm for the project. Special thanks go also to Chuck Peterson, Dan Foster, Jason Lyon, and Jack Sullivan's Biology Laboratory for resource materials, species identification, and information regarding natural history of selected species. We would also like to thank the National Park Service personnel at Big Hole Battlefield for sharing species observation reports and providing field assistance.

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Tables

Table 1. Big Hole Battlefield amphibian and reptile species summary table. This table provides concise information about potential and observed amphibian and reptile species with their corresponding legal status, and summarizes the study results by distribution, estimated abundance, type of voucher taken, successful survey techniques, and the observed life stages. See Appendix A for other species that may occur but researchers on this project judged not likely to occur.

Scientific Name	Common Name	Conservation Status	Distribution*	Estimated Abundance*	Voucher	Successful Sampling Techniques*	Comments	Park Status
Confirmed Amphibians								
Bufo boreas	western toad	S	Limited	Rare		Incidental Observation	Adult	Present
Rana luteiventris	columbia spotted frog		Widespread	Abundant	Photograph, Museum Specimen	Visual Encounters, Incidental Observation, Funnel Traps	Juvenile, Adult	Present
No Unconfirmed but Expected Amphibians								
Confirmed Reptiles								
Thamnophis elegans	western terrestrial garter snake		Widespread	Abundant	Photograph	Visual Encounters, Incidental Observation	Juvenile, Adult	Present
Thamnophis sirtalis	common garter snake		Widespread	Abundant	Photograph	Visual Encounters, Incidental Observation	Juvenile, Adult	Present
No Unconfirmed but Expected Reptiles								
Classification Information:		Based on ranking from the Montana Natural Heritage Program 2002	Widespread (3) Intermediate (2) Limited (1)	Abundant (>10) Common (6-10) Uncommon (3-5) Rare (1-2)	Photograph Museum Specimen	Techniques Employed: Visual Encounters Road Driving Funnel Traps Incidental Observation Contributed Observation	Life Stages: Juveniles Adults	
		S= Species of Special Concern	* Based on this survey	* Based on this survey				
			Found in: 3 locations 2 locations 1 location	>10 individuals 6-10 individuals 3-5 individuals 1-2 individuals				

Table 2. Big Hole Battlefield mammal species summary table. This table provides concise information about potential and observed species with their corresponding legal status, and summarizes the study results by distribution, estimated abundance, type of voucher taken, successful survey techniques, and the observed life stages. See Appendix A for other species that may occur, but researchers on this project judged not likely to occur.

Scientific Name	Common Name	Conservation Status	Distribution*	Estimated Abundance*	Voucher	Successful Sampling Techniques*	Comments	Park Status
Confirmed								
Alces alces	moose		Widespread	Common	Photograph	Incidental Observation	Juvenile, Adult	Present
Canis latrans	coyote		Intermediate	Abundant		Tracks/dens/scat		Present
Canis lupus	gray wolf	E				Tracks/dens/scat		Present
Castor canadensis	american beaver		Widespread	Common		Visual Encounter	Juvenile, Adult	Present
Cervus elaphus	elk		Widespread	Common		Incidental Observation	Adult	Present
Erethizon dorsatum	common porcupine		Intermediate	Uncommon		Incidental Observation	Adult	Present
Lemniscus curtatus	sagebrush vole		Limited	Rare		Trapping, Funnel Traps	Adult	Present
Lepus americanus	snowshoe hare		Widespread	Abundant	Photograph	Visual Encounter	Juvenile, Adult	Present
Lepus townsendii	white-tailed jack rabbit		Intermediate	Common		Visual Encounter	Adult	Present
Martes americana	american marten					Tracks/dens/scat		Present
Mephitis mephitis	striped skunk		Widespread	Common		Visual Encounter	Juvenile, Adult	Present
Microtus longicaudus	long-tailed vole		Limited	Rare		Trapping	Adult	Present
Microtus montanus	montane vole		Widespread	Common	Photograph	Trapping	Juvenile, Adult	Present
Microtus pennsylvanicus	meadow vole		Widespread	Common		Trapping	Juvenile, Adult	Present

Scientific Name	Common Name	Conservation Status	Distribution*	Estimated Abundance*	Voucher	Successful Sampling Techniques*	Comments	Park Status
Mustela erminea	short-tailed weasel					Tracks/dens/scat		Present
Neotoma cinerea	bushy-tailed woodrat		Limited	Rare		Incidental Observation	Adult	Present
Odocoileus hemionus	mule deer		Intermediate	Common		Visual Encounter	Adult	Present
Odocoileus virginianus	white-tailed deer		Intermediate	Common		Visual Encounter	Juvenile, Adult	Present
Ondatra zibethicus	common muskrat		Limited	Rare		Incidental Observation	Adult	Present
Peromyscus maniculatus	deer mouse		Widespread	Abundant		Trapping	Juvenile, Adult	Present
Sorex cinereus	masked shrew		Intermediate	Rare		Trapping		Present
Sorex monticolus	dusky shrew		Intermediate	Rare		Trapping		Present
Sorex vagrans	vagrant shrew		Limited	Rare		Trapping		Present
Spermophilus columbianus	columbian ground squirrel		Widespread	Abundant		Visual Encounter, Trapping	Juvenile, Adult	Present
Spermophilus lateralis	golden-mantled ground squirrel		Intermediate	Common		Incidental Observation	Adult	Present
Sylvilagus nuttallii	nuttall's/ mountain cottontail		Limited	Uncommon		Visual Encounter	Juvenile, Adult	Present
Tamias amoenus	yellow-pine chipmunk		Widespread	Uncommon		Visual Encounter, Trapping	Juvenile, Adult	Present
Tamias ruficaudus	red-tailed chipmunk		Widespread	Uncommon		Visual Encounter, Trapping	Juvenile, Adult	Present
Tamiasciurus hudsonicus	red squirrel		Widespread	Common		Incidental Observation	Juvenile, Adult	Present

Scientific Name	Common Name	Conservation Status	Distribution*	Estimated Abundance*	Voucher	Successful Sampling Techniques*	Comments	Park Status
Taxidea taxus	american badger		Intermediate	Uncommon		Tracks/dens/scat		Present
Thomomys talpoides	northern pocket gopher		Widespread	Abundant		Tracks/dens/scat		Present
Zapus princeps	western jumping mouse		Widespread	Common		Trapping	Juvenile, Adult	Present
Unconfirmed but Expected								
Clethrionomys gapperi	southern red-backed vole							
Mustela frenata	long-tailed weasel							
Ursus americanus	american black bear							
Vulpes fulva	red fox							
Classification Information:		Based on ranking from the Montana Natural Heritage Program 2002	Widespread (3) Intermediate (2) Limited (1)	Abundant (>10) Common (6-10) Uncommon (3-5) Rare (1-2)	Photograph Museum Specimen	*Techniques Employed:* Visual Encounters Road Driving Funnel Traps Incidental Observation Contributed Observation Tracks/dens/scat Trapping	Life Stages: Juveniles Adults	
		E= Endangered	* Based on this survey	* Based on this survey				
			Found in: 3 locations 2 locations 1 location	>10 individuals 6-10 individuals 3-5 individuals 1-2 individuals				

Table 3. The number of amphibian and reptile species detected at Big Hole Battlefield through sign (tracks, den sites, scat, calls, etc.), trapping, and/or direct observation.

		Big Hole Battlefield
Amphibians	western toad	1
	columbia spotted frog (est. #)	>2000
Reptiles	western terrestrial garter snake	5
	common garter snake (est. #)	>30

Table 4. The number of mammal species detected at Big Hole Battlefield through sign (tracks, den sites, scat, calls, etc.), trapping, and/or direct observation. Species in bold were most frequently detected.

american badger	sign
american beaver	direct observation
american marten	sign
bushy-tailed woodrat	1
columbian ground squirrel	3, direct observation
common muskrat	1
common porcupine	sign
coyote	direct observation
deer mouse	28
dusky shrew	2
elk	direct observation
golden-mantled ground squirrel	direct observation
gray wolf	sign
long-tailed vole	1
masked shrew	2
meadow vole	10
montane vole	7
moose	direct observation
mule deer	direct observation
northern pocket gopher	sign
nuttall's/ mountain cottontail	direct observation
red squirrel	direct observation
red-tailed chipmunk	3
sagebrush vole	1
short-tailed weasel	direct observation
snowshoe hare	direct observation
striped skunk	direct observation
vargrant shrew	1
western jumping mouse	8
white-tailed deer	direct observation
white-tailed jack rabbit	direct observation
yellow pine chipmunk	5

Figures

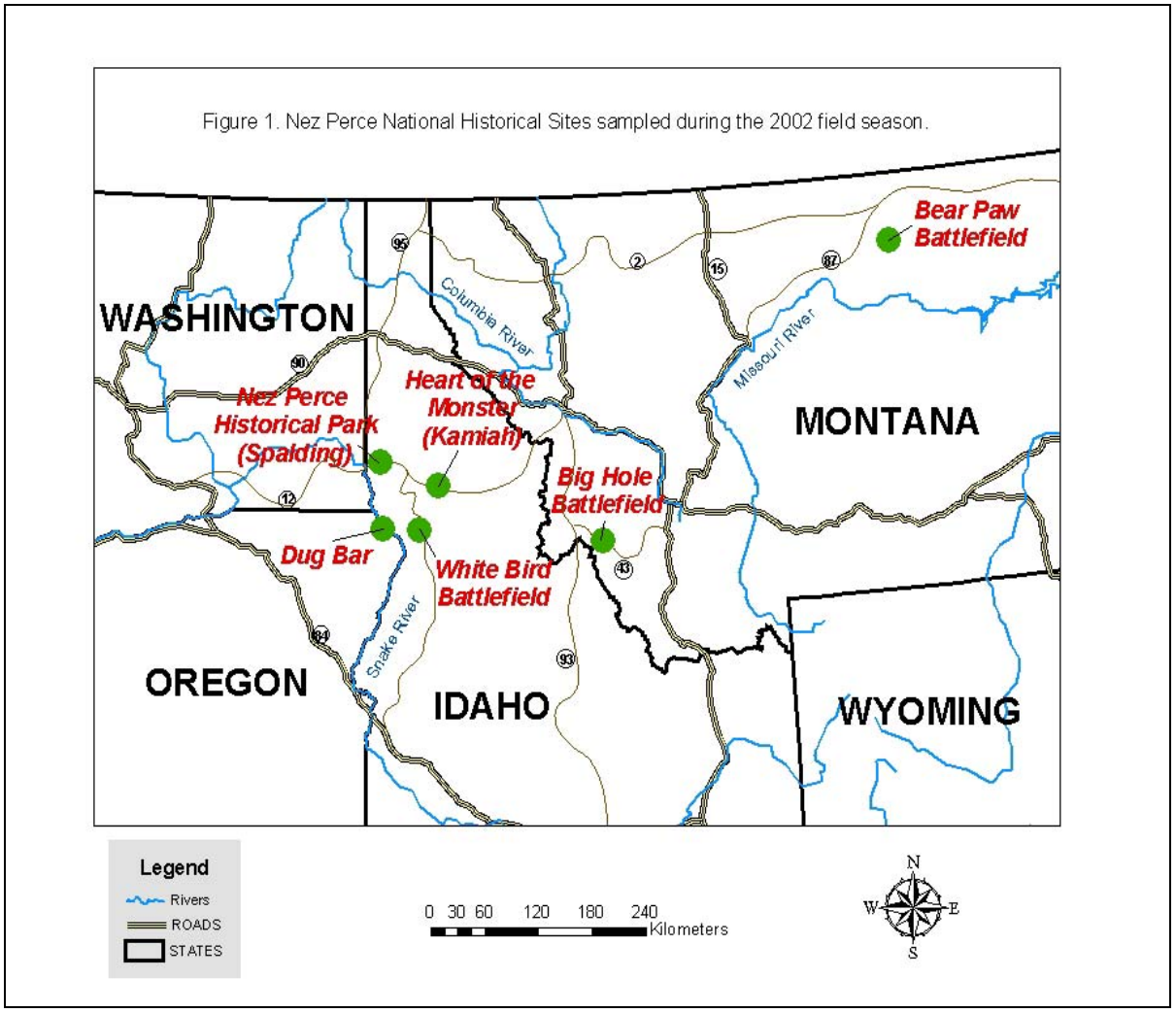

Figure 1. The 5 sites included in the 2002 Nez Perce National Historical Park mammal and herpetological inventory and the Big Hole Battlefield. The Nez Perce sites are shown on this map but are treated in a separate inventory report.

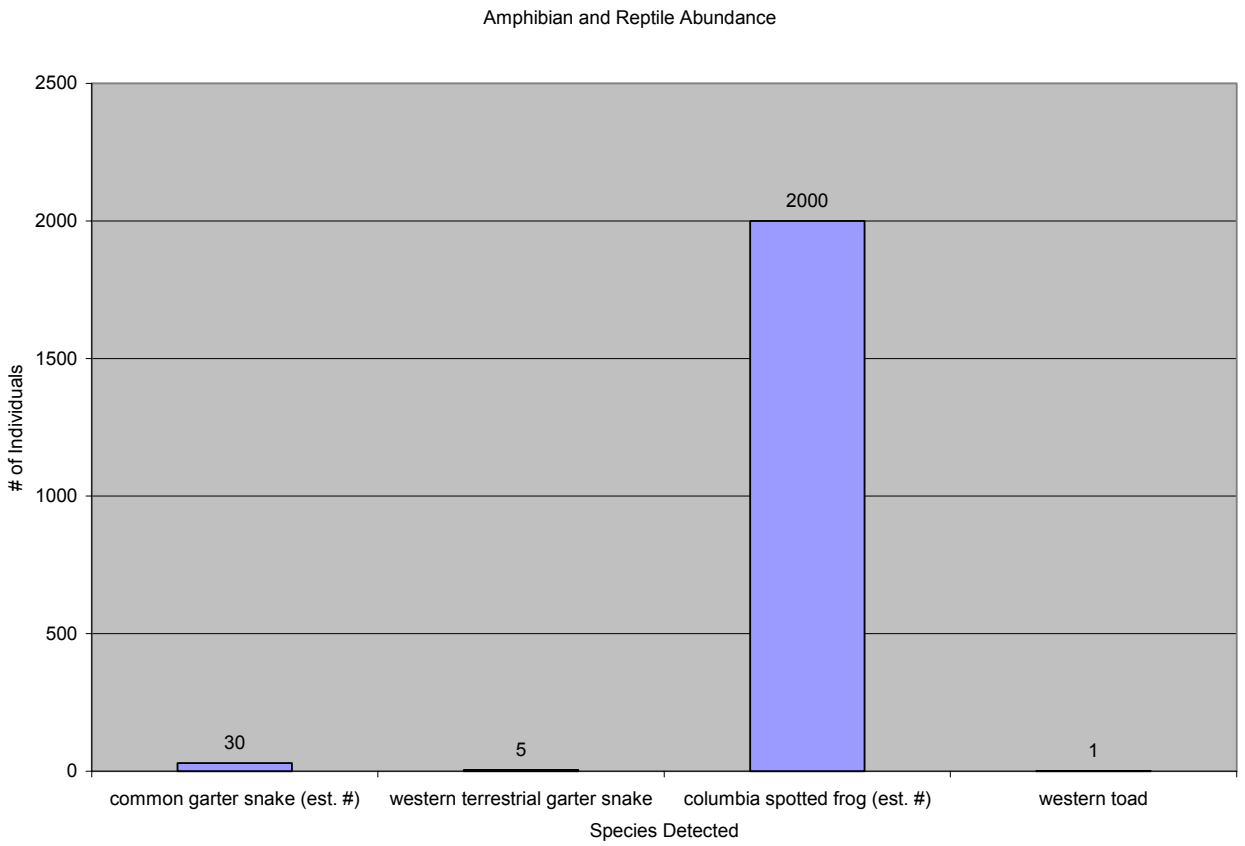

Figure 2. Amphibian and reptile species detected and the estimated number of individuals at Big Hole National Battlefield.

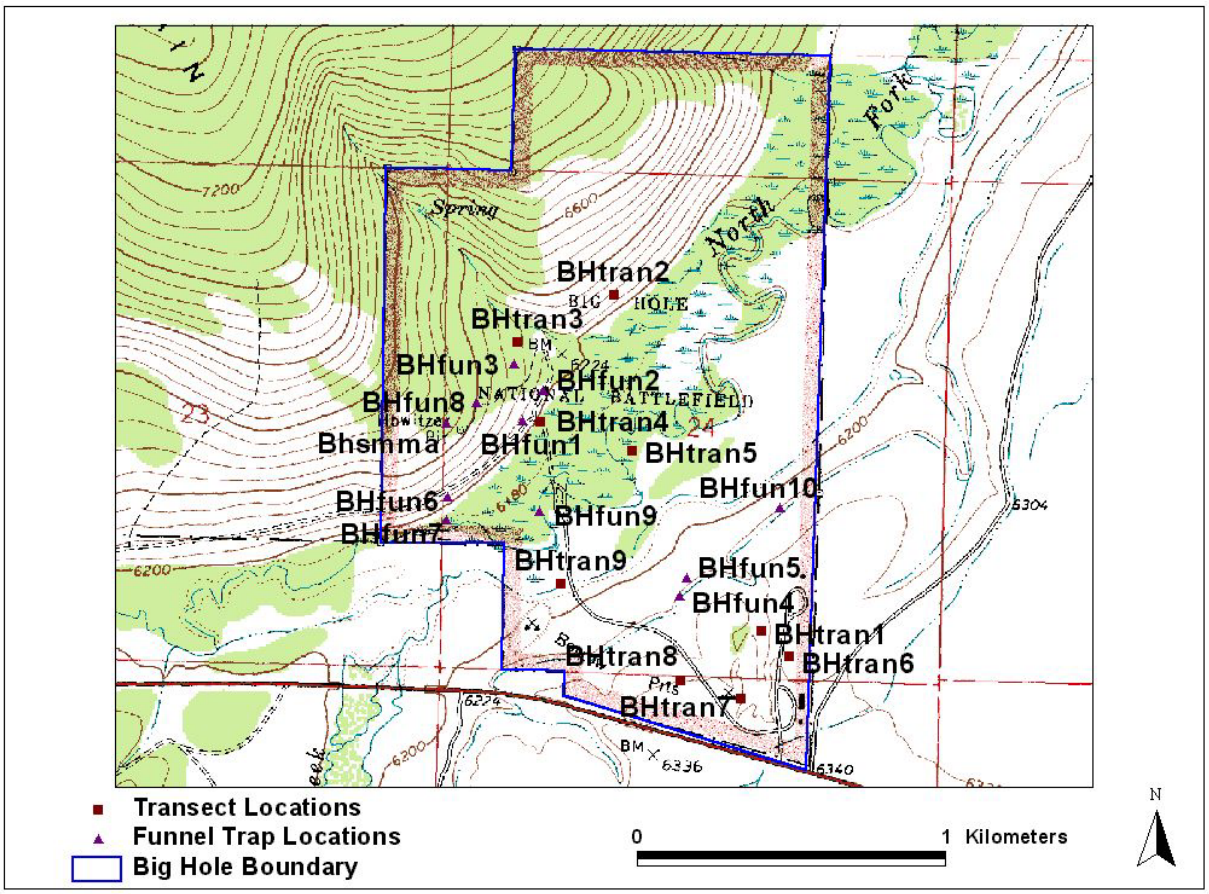

Figure 3. Sherman live trap transect and wire funnel trap locations for the 2002 inventory at Big Hole National Battlefield, Montana.

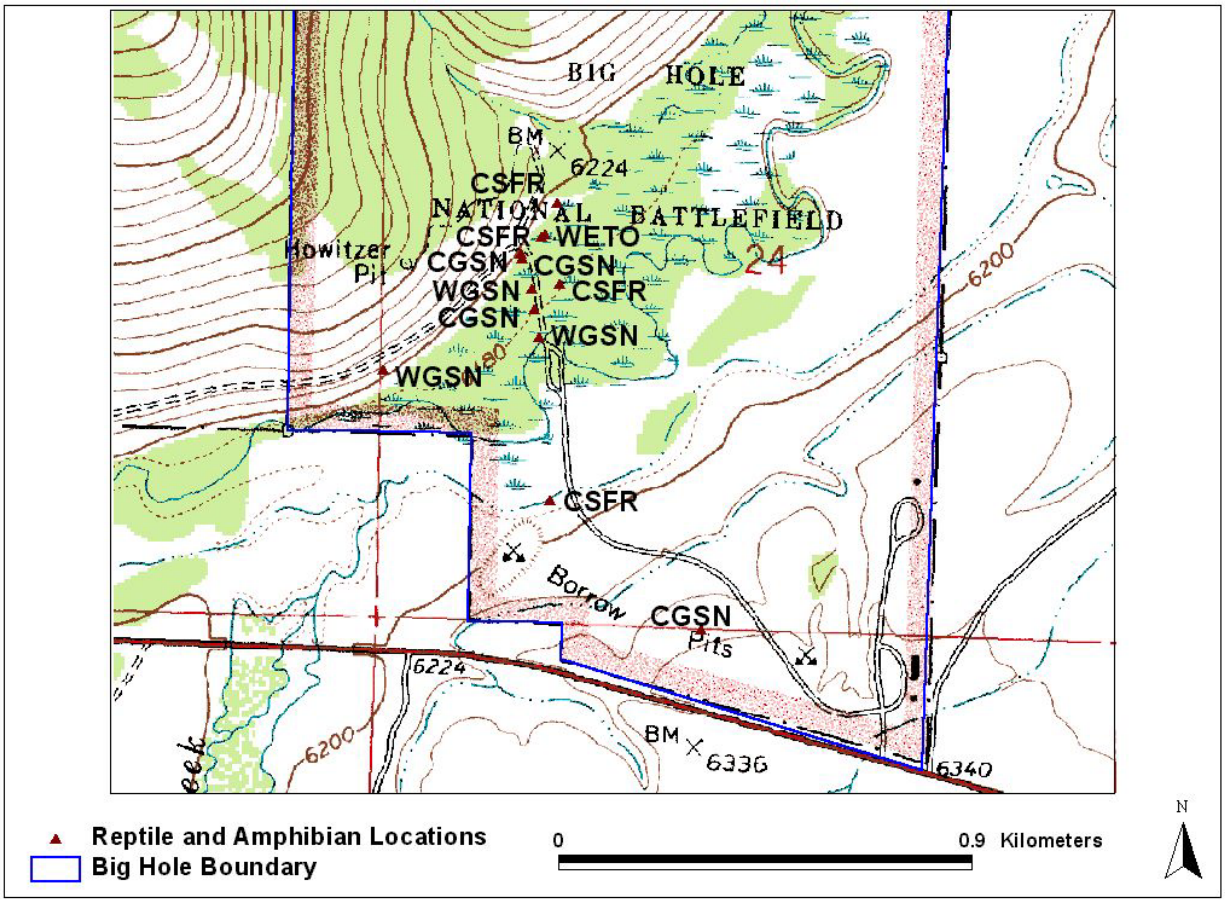

Figure 4. Incidental observation locations of reptiles and amphibians during the 2002 inventory at Big Hole National Battlefield, Montana.

Appendix A

Table A-1. Summary of information for determining park status of amphibian and reptile species not detected at Big Hole National Historic Battlefield.

Scientific Name	Common Name	Within Range	Elevation	Habitat	Detectability	Remarks	Status
Charina bottae	rubber boa	Yes	Yes	Yes	Low	Possible	Not Present
Coluber constrictor	racer	Possible	Yes	Yes	Variable	Unlikely	Not Present

Table A-2. Summary of information for determining park status of mammal species not detected at Big Hole Battlefield.

Scientific Name	Common Name	Within Range	Elevation	Habitat	Detectability	Remarks	Status
Antilocapra americana	pronghorn antelope	No	Too High	Yes	High	Unlikely	Unconfirmed
Clethrionomys gapperi	southern red-backed vole	Yes		Yes		Likely	Probably Present
Glaucomys sabrinus	northern flying squirrel	Yes	Yes	Yes	Low	Possible	Unconfirmed
Gulo gulo	wolverine	Yes	Yes	Limited	Low	Unlikely	Not Present
Lontra canadensis	northern river otter	Yes	Yes	Limited	Variable	Possible	Not Present
Lynx canadensis	lynx	Yes	Yes	Limited	Low	Possible	Unconfirmed
Lynx rufus	bobcat	Yes	Yes	Yes	Low	Possible	Not Present
Marmota caligata	hoary marmot	Yes		Limited	Variable	Unlikely	Not Present
Marmota flaviventris	yellow-bellied marmot	Yes	Yes	Limited	High	Unlikely	Not Present
Martes pennanti	fisher	Possible	Yes	Yes	Low	Possible	Not Present
Microtus richardsoni	water vole	Yes		Yes	Variable	Possible	Not Present
Mustela frenata	long-tailed weasel	Yes	Yes	Yes	Variable	Likely	Probably Present
Mustela vision	mink	Yes	Yes	Yes	Variable	Possible	Unconfirmed
Ochotona princeps	american pika	Yes		Limited	Variable	Unlikely	Not Present
Phenacomys intermedius	heather vole	Yes	Yes	Yes		Possible	Unconfirmed
Procyon lotor	common raccoon	Yes		Yes	High	Possible	Not Present
Puma concolor	mountain lion	Yes	Yes	Yes	Low	Possible	Not Present
Sorex hoyi	pygmy shrew	Yes	Yes	Yes	Low	Possible	Unconfirmed
Sorex palustris	common water shrew	Yes	Yes	Yes	Low	Possible	Not Present
Sorex preblei	Preble's shrew	Yes	Yes	Yes	Low	Possible	Unconfirmed
Tamias minimus	least chipmunk	No	Yes	Yes	High	Possible	Unconfirmed
Ursus americanus	american black bear	Yes	Yes	Yes	Variable	Likely	Probably Present
Vulpes fulva	red fox	Yes	Yes	Yes	Low	Likely	Probably Present

Appendix B

Form 1. Amphibian and reptile individual observation form used at the Big Hole National Battlefield.

AMPHIBIAN AND REPTILE INDIVIDUAL OBSERVATION FORM

(April 2002)

Please provide whatever information you can, even if you are unsure of the species.

Species: _____ Number of Animals _____

Observation Date: ____/____/____ Time: _____ am pm (circle one)

Observer Name(s) _____

Affiliation: _____

Address: _____

Phone No: _____ Have you seen this species before? _____

Description of Animal (size, color, pattern, pupil shape, skin texture, etc.): _____

_____ Did you photograph the animal? _____

Description of Animal's Behavior: _____

Animal's Location: (Be as accurate as possible; e.g., 4.5 miles north and 3.3 miles east of known landmark; Latitude and Longitude; UTM coordinates; or Range, Township, and Section):

County _____ State _____

Habitat: _____

Weather: (temperature, cloud cover, wind, etc.): _____

Remarks: _____

Please return to:

Dr. Chuck Peterson
Idaho Museum of Natural History
Box 8007, Idaho State University
Pocatello, Idaho 83209
(208) 282-3922 office 2824570 FAX E-mail: petechar@isu.edu Website: www.isu.edu/~petechar

Form 2. Amphibian and reptile survey data sheet used for all wetland sites.

AMPHIBIAN SURVEY DATA SHEET - modified after S.P. Corn, NBS, Fort Collins, CO (ver. 1 May 1996)

Herpetology Laboratory, Idaho State University and Idaho Museum of Natural History, Box 8007, Pocatello, ID 83209
(208) 236-3922 voice 236-4570 FAX e-mail: petechar@isu.edu

DATE		**BEGIN TIME**		**END TIME**		**OBSERVERS**		
LOCALITY								
STATE		**COUNTY**		**MAP NAME**		**OWNER**	**ELEVATION**	
T	**R**	**S**		**UTM ZONE/DATUM**		**NORTHING**	**EASTING**	
AMPHIBIAN AND REPTILE SPECIES PRESENT (INDICATE NUMBERS IN CATEGORIES IF POSSIBLE)								
SPECIES	**ADULT**	**JUVENILE**	**METAM.**	**LARVAE**	**EGGS**	**CALLING**	**TECHNIQUE(S)**	**VOUCHER**
FISH PRESENT		YES ??? NO		**FISH SPECIES:**				
ENTIRE SITE SEARCHED?		YES NO		**IF NO, IDICATE AREA:**			meters of shoreline habitat	
WEATHER:	**RADIATION:** CLEAR PARTIAL OVERCAST					**WIND**: CALM LIGHT MEDIUM HEAVY		
AIR TEMPERATURE (1 M SHADED)		**°C OR F**		**% CLOUD COVER:**		**PRECIPTATION:** SNOW RAIN		
WATER	**TEMPERATURE (1CM)**			**pH:**		**CONDUCTIVITY**	**SAMPLE?**	
	COLOR CLEAR STAINED			T**URBIDITY** CLEAR CLOUDY				
SITE DESCRIPTION	PUT SKETCH AND ADDITIONAL COMMENTS ON BACK OF SHEET							
ORIGIN NATURAL MAN-MADE MAN-MODIFIED				**DRAINAGE** PERMANENT OCCASIONAL NONE				
SITE TYPE TEMPORARY or PERMANENT LAKE/POND MARSH BOG STREAM SPRING/SEEP ACTIVE or INACTIVE BEAVER POND								
NATIONAL WETLAND INVENTORY CLASIFICATION				**GAP ANALYSIS COVER TYPE (IF KNOWN)**				
STREAM ORDER 1 2 3 4 5 6								
SITE LENGTH m	**SITE WIDTH** m			**MAXIMUM DEPTH** < 1M 1 - 2 M > 2 M				
PRIMARY SUBSTRATE SILT/MUD SAND/GRAVEL COBBLE BOULDER/BEDROCK OTHER:								
% OF LAKE MARGIN WITH EMERGENT VEGETATION 0 1 - 25 25 - 50 >50								
EMERGENT VEGETATION SPECIES (IN ORDER OF ABUNDANCE)								
NORTH SHORELINE CHARACTERISTICS				SHALLOWS PRESENT	SHALLOWS ABSENT	EMERGENT VEG PRESENT	EMERGENT VEG ABSENT	
DISTANCE TO FOREST EDGE m				**FOREST TREE SPECIES**				

Form 3. Data form used for all small mammal transects deployed.

Small Mammal Transect Form **ID #:_____**

Observer:_____ Origin UTM:_____
Prebait Date:_____ Transect Bearing:_____
Open Date:_____ Check Date:_____
Slope:_____ Aspect:_____ Elevation:_____

Location Description:_____

_____

Habitat Description:_____

Weather During Trap Period:_____

Trp	Species	Cap #	Age/Sex	Wgt	Location	Microhabitat	Voucher #	UTM	L T HF
1									
2									
3									
4									

Trp	Species	Cap #	Age/Sex	Wgt	Location	Microhabitat	Voucher #	UTM	L T HF
5									
6									
7									
8									
9									
10									

Form 4. Data form used for all wire funnel traps and small mammal live traps deployed.

Wire Funnel Trap Capture Form **ID#_____**

Observer:_____ Open Date:_____ Close Date:_____

Center UTM:_____ Elevation:_____

Capture Period Weather:_____ Slope:_____ Aspect:_____

Location Description:_____

_____

Habitat Description:_____

Capture #	Capture Date	Species	Age/Sex	L	T	HF Voucher

ID#_____

Observer:_____ Open Date:_____ Close Date:_____

Center UTM:_____ Elevation:_____

Capture Period Weather:_____ Slope:_____ Aspect:_____

Location Description:_____

_____

Habitat Description:_____

Capture #	Capture Date	Species	Age/Sex	L	T	HF Voucher

Appendix C

NPSpecies codes developed for all National Park Service species present.

PARK STATUS

- **(P) Present:**
  Species occurrence in park is documented and assumed to be extant.
- **(H) Historic:**
  Species historical occurrence in the park is documented, but recent investigations indicate that the species is now probably absent.
- **(PP) Probably Present:**
  Park is within species range and contains appropriate habitat. Documented occurrences of the species in the adjoining region of the park give reason to suspect that it probably occurs within the park. The degree of probability may vary within this category, including species that range from common to rare.
- **(E) Encroaching**
  The species is not documented in the park, but is documented as being adjacent to the park and has potential to occur in the park.
- **(U) Unconfirmed:**
  Included for the park based on weak (unconfirmed) record or no evidence, giving minimal indication of the species occurrence in the park.
- **(FR) False Report:**
  Species previously reported to occur within the park, but current evidence indicates that the report was based on a misidentification, a taxonomic concept no longer accepted, or some other similar problem of interpretation.

SPECIES ABUNDANCE

- **(A) Abundant:**
  Animals: May be seen daily, in suitable habitat and season, and counted in relatively large numbers.
- **(C) Common:**
  Animals: May be seen daily, in suitable habitat and season, but not in large numbers.
- **(U) Uncommon:**
  Animals: Likely to be seen monthly in appropriate season/habitat. May be locally common.
- **(R) Rare:**
  Animals: Present, but usually seen only a few times each year.
- **(O) Occasional:**
  Occurs in the park at least once every few years, but not necessarily every year. Applicable to animals only.
- **(UNK) Unknown:**
  Abundance unknown.

RESIDENCY

- **(B) Breeder:**
  Population reproduces in the park.
- **(R) Resident:**
  A significant population is maintained in the park for more than two months each year, but it is not known to breed there.
- **(M) Migratory:**
  Migratory species that occurs in park approximately two months or less each year and does not breed there.
- **(V) Vagrant:**
  Park is outside of the species usual range.
- **(UNK) Unknown:**
  Residency status in park is unknown.

SPECIES NATIVITY

- **(N) Native:**
  The species is native to the park (either endemic or indigenous), or if the Park Status is Probably Present as defined above, the species would be native to the park if it were eventually confirmed in the park.
- **(E) Non-Native (EXOTIC):**
  The species is not native to the park (neither endemic nor indigenous), or if the Park Status is Probably Present as defined above, the species would not be native to the park if it were eventually confirmed in the park. Persistent plant populations (as defined below) that reproduce are also considered non-native.
- **(UNK) Unknown:**
  Nativity classification in park is unknown.

SPECIES OF MANAGEMENT PRIORITY

(Y) YES

or (N) NO

IF YES:

Write Management Priority Details on a separate sheet of paper.

SPECIES OF EXPLOITATION CONCERN

(Y) YES

or (N) NO

IF YES:

Write Exploitation Concern Details on a separate sheet of paper.

Appendix D

Representative Photos: Oxbows and an overview of Big Hole National Battlefield (Wisdom), Montana.